

ENVIRONMENTAL USES OF COMPOST AND MULCH

Although environmental uses for compost appear to be a huge market, there are limited numbers of successful programs that have tapped this great market potential. Still, it is clear that with the invention of pneumatic application equipment, i.e., 'blower trucks', the future use of compost in some of these environmental applications will only increase.

The markets for composts can be divided into six mature sectors, with several other markets emerging. The mature market sectors are agriculture, landscaping, nurseries, public agencies, residential use, and land reclamation/landfill cover.

Emerging markets include:

- Erosion and sediment control at construction sites.
- Stormwater runoff filtration and treatment.
- Re-vegetation of sites for habitat restoration.
- Reforestation of denuded sites.
- Restoration of damaged wetlands.
- Remediation of damaged turf grasses and soil compaction problems.
- Control of plant disease problems (bio-pesticides). Compost controls or suppresses certain soil-borne plant pathogens and nematodes.
- Bioremediation of contaminated sites.
- Vapor-phase biofiltration of contaminated exhaust air streams.

EROSION CONTROL AND SLOPE STABILIZATION

Erosion occurs when wind and rain dislodge topsoil from fields and hillsides. Stripped of its valuable top layer, which contains many essential nutrients, the soil left behind is often too poor to sustain good plant growth. Eroded topsoil can also be carried into rivers, streams, and lakes. This excess sediment, sometimes containing fertilizers or toxic materials, threatens the health of aquatic organisms. It can also compromise the commercial, recreational, and aesthetic value of water resources. As a result, preventing erosion is essential for protecting waterways and maintaining the quality and productivity of soil.

Erosion is a naturally occurring process; however, it is often aggravated by activities such as road building and new construction. At the beginning of some construction projects, all vegetation and topsoil is removed, leaving the subsoil vulnerable to the forces of erosion. Because of its ability to retain moisture, compost also helps protect soil from wind erosion and during droughts.

In many slope situations, there is no real need to establish vegetation if a layer of mulch is effective in preventing erosion. But how long will the compost or composted mulch last? Will annual applications be required? The norm is to try and establish vegetation, regardless of the severity of the slope. As a result, using compost for slope stabilization and erosion control may meet some barriers in the field in that it may not be readily accepted unless seeding is performed on top of the compost layer. Using both seed and compost applications may or may not be more cost effective than current practices. Certainly, in severe cases where vegetation has not been able to be established, compost may be the ONLY option left to try.

SEDIMENT CONTROL

Filter berms (mounds) can be used for sediment control at the top or bottom of slopes and around the edges of construction sites. They are typically 30-60cm tall and 90-120cm wide depending on the steepness of the slope. Compost berms are more effective than silt fences or hay bales because they capture sediment and allow water to drain. They are more stable and generally don't 'blow out' during heavy rain storms. If one is breached, it is easily repairable.

Reasons to use filter berms:

- The compost will eventually decompose and amend native soil, assisting in vegetation establishment.
- The berms can be easily be incorporated into native soil when the job is completed, which means less hassles at the end of long projects.
- Incorporated material left on site provides better organic matter levels for seeding/planting.
- Filter berms are less expensive than silt fence.
- Filter berms are more effective in removing sediment and clearing up our waterways.
- Filter berms are more effective at removing chemical compounds from runoff.
- Compost is an annually renewable resource, all organic, and 100% natural.

How organic materials prevent erosion?

Compost is a versatile, useful product which reduces erosion when used as a filter berm or erosion control blanket. When filter berms are used in combination with slope protection via a layer of compost or composted mulch, you can expect minimal erosion. Most experts in the field have noted they are surprised how well filter berms hold up under heavy rains.

There are two main reasons these two applications assist in reducing erosion. First, filter berms reduce the speed of water flowing on a given slope. By preventing speed of water, which reduces also the speed of soil particles tumbling down the slope, overall displacement of other soil particles is reduced. Many applications have tried a series of filter berms down the slope which has worked well to slow the water down long enough to reduce erosion of the slope and to provide additional protection for receiving waters.

A layer of compost or composted mulch applied to the slope acts like a 'wet blanket' or a 'wet deck of cards' scattered randomly over the surface. Soil particles are normally round and roll easily once displaced by water. As they gain speed and momentum, they displace other soil particles which channel together in faster moving water and this creates small rills. Rills lead to channels and channels lead to gullies. The rounder the soil, steeper the slope and greater quantity of water, the more erosion. Compost and composted mulch prevents the soil from rolling or gaining this momentum and therefore covers it like a blanket. A secret of success in the field is making sure that water is not able to 'get under the blanket' at the top of the slope. If water is allowed to get under the layer of compost, and if the slope is steep, you can expect erosion and the compost or composted mulch will float away. However, if you have a filter berm at the top of the slope and keep the compost layer continuous over the 'shoulder' of the slope, the water will hit the slope and ride all the way to the bottom on top of the blanket of organic materials.

Filter socks (mesh socks containing compost or mulch material) can also be used instead of berms, because socks have a greater ability to withstand concentrated flows and to retain sediment. Another application in municipal landfills is to use compost produced from a mixture of poultry manure, sawdust and other wood residuals to control erosion, as a soil amendment and to create a vegetated cover over closed landfill cells.

STORMWATER FILTRATION

Stormwater filtration is a relatively new use for compost. Although only a few commercial systems exist in the United States, the promise of using compost in filter systems lies in the effectiveness of capture rates compost offers compared to other filter systems. Also the contaminant binding ability of compost is important for storm water treatment and has been shown to minimize leaching of pesticides in soil systems. The added benefit is that compost can normally be purchased locally, is annually renewable, and there are good long term odds that this use will also become more mainstream in the next 10 years. This will be further enhanced by recent focuses on water quality and quantity issues.

VEGETATION ESTABLISHMENT

For vegetation establishment, compost is perhaps the number one soil amendment when used for turf. For other vegetation establishment, hydroseeding is still popular. In hydroseeding the seed, water and compost are mixed and sprayed on ground to establish vegetation. However, recent comparisons of costs for hydroseeding vs. vegetation establishment with compost and seed applied via a blower truck have proven favorable. After all, what would you rather have – a hydroseeded lawn or a lawn seeded with compost? For other environmental applications, like the slopes mentioned earlier, seeding is even more tedious than turf, so the likelihood of compost use increasing in these applications is nearly 100%.

Organic materials are more flexible, lighter, and absorb more water than soils in general, so they aid in helping water infiltrate into the soil underneath. For vegetation establishment, this is crucial to new seedling germination. There are several case studies that have been conducted in the United States which have shown that compost has outperformed hydromulch. On steep embankments along roads and highways, compost can be more effective than traditional hydromulch at reducing erosion and establishing turf because compost forms a thicker, more permanent growth due to its ability to improve the structure of the soil. Depending on the length and height of a particular slope, a 5-7cm layer of mature compost placed directly on top of the soil, has been shown to control erosion by enhancing planted or volunteer vegetation growth.

WETLAND RESTORATION

Organic matter in the soils of our wetlands has decreased steadily. As urbanization continues to expand, wetlands are often destroyed in the construction of roads and other structures. Today, environmental regulations are in place which requires the re-establishment of wetlands as a means of improving water quality. The goal of any wetlands mitigation project is to develop a wetland that functions well in terms of hydrology, soil properties and plant community composition.

Compost, with its high organic matter content, can absorb up to four times its weight in water and can replace essential organic material which is needed to re-establish targeted wetland plant species. A study by the Clean Washington Center in US found that using compost increased the rates of survival for targeted wetland species and did not degrade the water quality. For best results, a highly organic, microbially active soil which possesses similar physical and chemical properties to those of native wetland soils must be developed. To develop an effective wetlands media using compost, it is important to understand the soluble salt and nutrient levels of the compost and their relationship to the wetland plants being established.

REMEDIATING TURF GRASSES

Providing safe, uniform playing surfaces for recreational activities, such as golf, football, soccer, and other field sports, requires intensive turf management.

Recreational turf grasses are subjected to extensive wear and tear, making them difficult to manage and highly susceptible to turf diseases, pests, and soil compaction. To address these problems, turf managers traditionally use a combination of fertilizers, pesticides, fungicides, and aeration techniques that usually result in high costs and potential for negative environmental impacts. Some turf managers are now using compost to replace peat moss in their topdressing applications based on its proven success in suppressing plant disease. Compost, when properly formulated, unlike peat moss, is teeming with nutrients and micro-organisms that stimulate turf establishment and increase its resistance to common turf diseases, such as snow mold, brown patch, and dollar spot.

Soil compaction is another persistent landscape management problem, particularly in areas of heavy traffic, such as parks, zoos, golf courses, and athletic playing fields. Compacted soil impedes healthy turf establishment by inhibiting the movement of air, water, and nutrients within the soil. Bare soil, weeds, increased runoff, and puddling after heavy rains are the most obvious signs of a soil compaction problem. Traditional methods for alleviating soil compaction— aeration, reseeding, or complete resodding— are labor-intensive and expensive, and provide only short-term solutions. Some turf managers are starting to use compost and compost amended with bulking agents, such as wood chips, as cost-effective alternatives. Incorporating tailor made composts into compacted soils improves root penetration and turf establishment, increases water absorption and drainage, and enhances resistance to pests and disease. Using tailored compost can also significantly reduce the costs associated with turf management.

POLLUTION REMEDIATION AND PREVENTION

- Absorbs odors and degrades volatile organic compounds.
- Binds heavy metals and prevents them from migrating to water resources or being absorbed by plants. It helps to neutralize toxins and metals, such as cadmium and lead, by bonding to them so plants can't take them up.
- Bioremediation: degrades, and in some cases, completely eliminates wood preservatives, petroleum products, pesticides, and both chlorinated and non-chlorinated hydrocarbons in contaminated soils.
- Avoids methane production and leachate formation in landfills by diverting organics for composting.
- Prevents pollutants in storm water runoff from reaching water resources.
- Prevents erosion and silting on embankments parallel to creeks, lakes, and rivers.
- Prevents erosion and turf loss on roadsides, hillsides, playing fields, and golf courses.

MINE AND GRAVEL PIT RECLAMATION

Compost can also be used to reclaim surface mines and gravel pits. Low quality compost can be used directly. Compost can also be mixed with non-toxic tailing materials to make a blended topsoil. The compost will provide organic matter and nutrients to restore compacted or stripped soil and re-establish vegetation in the area. High organic matter also helps to bind any soluble metals in the soil.

ECONOMIC BENEFITS OF USING COMPOST

- Results in significant cost savings by reducing the need for water, fertilizers, and pesticides.
- Produces a marketable commodity and a low-cost alternative to standard landfill cover and artificial soil amendments.
- Extends municipal landfill life by diverting organic materials from the waste stream.
- Provides a less costly alternative to conventional bioremediation techniques.

Recommended application rates for compost from the Composting Counsel, 1994. (SKB Environmental, 1998)